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ABSTRACT

This study examines the effect of expectation (children's judgments as to the probable actor within a given sentence) upon comprehension of passive sentences, the relationship of syntactic comprehension to the paradigmatic-syntagmatic shift in word associations, and the effect of sex on each. Forty first-graders and 40 kindergarteners were blocked by sex and word association (by a median-split). Repeated measures for sentences harmonious, neutral, and contrary to expectations were analyzed in factorial design employing grade, sex, word association and expectations. Results of this study bear on effects of semantic features upon children's comprehension of syntax. (Author)

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The Effect of Children's Expectations and Word Associations Upon the Comprehension of Passive Sentences

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Introduction and Background

Sentences corresponding to an individual's expectations, knowledge of the world, or assessment of probability are easier to process than sentences contradictory to one's epistemological system. Herriott (1969) concluded from a study of adults' processing of the passive transformation that pragmatic expectations, originating in "previous knowledge of the world or of the words" (p. 169), and independent of grammatical order, provide important cues to comprehension. Nonreversibility, meaning that only one of two nouns in a sentence could logically function as the subject, was found by Slobin (1966) to eliminate the differences in difficulty between active- and passive-voice sentences. Bever (1970) interpreted this effect as suggesting that strong semantic constraints eliminate the necessity of attending to syntactic factors. Using his example (p. 296), this would mean that (a) is no more difficult to verify than (b):

(a) the cookie was eaten by the dog;

(b) the dog ate the cookie.

In the Turner and Rommetveit (1967) study, first graders responded correctly 50 per cent of the time to sentences considered by the authors to be reversible. Even four-year-olds, however, responded correctly to semantically-constrained sentences. The percentage of correct responses to reversible passive sentences was considerably lower than that to non-

reversible passive and reversible and non-reversible active sentences. The most difficult sentences to comprehend, therefore, were the reversible passives.

In both the Slobin (1966) study and that by Turner and Rommetveit (1967), the non-reversible sentences were clearly not logically reversible. Hutson and Powers (1973) also used sentences near the extreme end of the continuum of possibility, and asked young children to "act out" with toys "probable" and "improbable" passive-voice sentences spoken by the experimenter. They, too, found that improbable or non-reversible sentences were more difficult to process.

Reversibility and non-reversibility have been defined in terms of the logic and epistemological systems typical of adults. Two attempts (Gowie and Powers, 1972; and Gowie, 1973) have been made to identify events which children considered likely in order that items could be constructed reflecting their expectations--- i.e., reversibility and non-reversibility were defined by the expectations of the children rather than a priori by adult standards. Gowie and Powers' (1972) study demonstrated that Kindergarteners and first graders did, indeed, have surprisingly definite expectations regarding what appeared to be neutral, or reversible, sentences. They found, for example, that children of both ages thought that "The kangaroo watches the seal" was much more likely than its reverse (Kindergarten: 14 of 16; Grade one: 12 of 15). Since, in the two grades, 26 children chose one particular noun as

actor, and only 5 chose the other, it seemed to be a violation of logic to consider both forms (kangaroo watches, seal watches) equally probable or logically possible, or to consider the sentence reversible from the point of view of the child. That is, although a sentence appears to be logically reversible, it may be effectively nonreversible to the child.

Gowie (1973) also investigated the effects of children's expectations on performance with an exceptional linguistic structure, finding that sentences harmonious with expectation were easier than contrary ones for children in Kindergarten and grades one and two to process.

Purpose

The primary purpose of the present study was to identify the expectations of children in Kindergarten and grade one, i.e., to determine which combinations they considered reversible and nonreversible, and then to examine the manner in which expectations influenced comprehension of the passive transformation. Because it seemed possible that a relationship might exist between the type of response a child gave to a word association test and performance with the passive voice, type of word association was used as a blocking variable. It has been noted that children younger than five to ten years of age tend to give as a verbal associate a word which, in natural speech frequently occurs with the stimulus word (Ervin, 1961; Entwisle, Forsyth, and Muuss, 1964). This type of res-

ponse (Syntagmatic) changes so that the older child and the average adult respond with a word of the same part of speech (paradigmatic response). This shift may be interpreted as an indicator of increasing linguistic maturity. The inclusion of the word association test, therefore, reflected the experimenter's interest in parallel developmental trends and in the interrelationship of semantics and syntax. A second blocking variable was the child's sex, since this factor had appeared in the statistically significant interactions found by Gowie and Powers (1972) in a similar study. This experimenter hoped to gain additional information about the relationship between sex and linguistic comprehension.

A secondary purpose of this study was to investigate the generalizability of the expectation effect. The mode of communication, both of presentation and of response, was exclusively verbal. An attempt was thereby made to approximate more closely the typical kinds of linguistic experiences a child encounters. It is not usual, other than in an experimental situation, for a child to demonstrate his understanding of a sentence by underlining a picture or manipulating toys or objects. Although these modes of response may provide useful information, they were rejected for the present study.

Subjects and Procedure

The subjects for the study were selected from the Kindergartens and first grades of public and parochial schools

located in or near the outskirts of Albany, New York. The population can reasonably be described as typically suburban.

The general procedure for the study was as follows: one sample of children responded to reversible items telling which noun they expected to be the actor; a second sample was administered a word association test and an instrument based on the expectations of the children in the initial sample.

Determining Expectations: A pool of 48 reversible items from which sentences could be constructed was established and arranged in two groups of 24 each. Children were then interviewed individually and asked about their expectations regarding 24 of the items. For example, a child would be asked "Do you think that a horse would kick a cow, or that a cow would kick a horse?" and his response was recorded. The procedure was repeated until 20 responses were obtained for each item (The order in which potential grammatical subjects occurred was reversed for half of the children in case there might be a tendency to select the noun in a particular location as subject.)

Items were classified as showing expectation if a distinct majority of the children chose one of the potential subjects as the actor, and as neutral if there was no clear preference.

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Expectations were determined independently in Kindergarten and first grade since previous work had shown that they change over age (Gowie and Powers, 1972). Therefore, a total of 80 children were employed in this part of the research (40 Kindergarteners, 20 responding to each of 24 items, and the same in first grade).

Final Instrument: From the pool of 48 items, the 16 about which the children indicated strongest expectations and the eight most clearly neutral were selected for use in the final instrumemt. Of the 16 items showing expectation, eight were used to construct harmonious sentences and eight to construct contrary. Thus, the final instrument consisted of 24 sentences. Again, the procedure was repeated independently in each of the two grades.

Tables 1 and 2 show the items that were used in the final instrument for each grade and the number of children selecting each alternative. All statements constituting the instrument were transformed into the passive voice; related questions were in the active voice.

Insert Tables 1 and 2 about here

A harmonious sentence was constructed by using as subject the noun selected most often by the children in the first sample. For example, item 1 in Table 1 became "The cow was kicked by the horse." A contrary sentence used as subject the noun least often selected by the children. For example, item 2 in Table 1 became "The mother was called by the girl." The sentences were presented in random order with respect to expectation.

Word Association Test: The word association test that was employed was comprised of seven nouns, seven verbs and seven adjectives identified by Carroll (1971) as having single grammatical functions. Respectively, the nouns, verbs and adjectives were: brother, car, day, jungle, river, siren, sky; ask, begin, read, shut, sit, tell, untie; alive, happy, old, sick, strong, tiny, wonderful.

Data Collection and Analysis: A random sample of 80 children, (20 males and 20 females in Kindergarten and in first grade), was drawn from schools not employed in the determination of expectations.

Each child was interviewed individually. Each of the 24 passive-voice sentences comprising the final instrument was read to the child, who told which of the potential grammatical subjects carried out the action. The word association test was then administered verbally and the child's responses were recorded.

Responses to the items on the word association test were classified as syntagmatic or paradigmatic and the number of paradigmatic responses was used as a blocking variable. Children were categorized as high or low paradigmatic responders by a median split within grade and sex.

The design was a 2 X 2 X 2 X 3 (grade, sex, word association, expectation) analysis of variance with word association nested within grade and sex and repeated measures on expectation. Due to the necessity of discarding some of the word

association data because of clang responses, there were only nine measurements per cell in the final design, rather than the intended 10.

Following the overall analyais of variance, significant main effects (where necessary) and interactions were further investigated through use of the least significant difference test and Tukey's procedure respectively.

Results

The results of the overall analysis of variance are shown in Table 3. Significant main effects were word assoc-

Insert Table 3 about here

iation ($p < .001$) and expectation ($p < .001$). The only significant interaction was grade by expectation ($p < .005$).

Word Association: Inspectation of the word association means showed that low paradigmatic responders (mean = 4.83) performed better than high paradigmatic responders (m = 4.19).

Expectation: To further investigate the significant main effect of expectation, the least significant difference (lsd) test was conducted on all pairs of means. All were significantly different ($p < .05$) in the direction expected. Performance was best in the harmonius condition (m = 5.29), followed by neutral (m = 4.39) and contrary (m = 3.85).

Grade by Expectation: Tukey's procedure was applied to all pairs of means in the grade by expectation interaction. The means are presented in Table 4 and a sketch of the interaction is given in Figure 1.

There was no significant difference between Kindergarten and first grade in the harmonious or contrary condition. In the neutral condition the somewhat surprising result that Kindergarteners performed higher than first graders was found.

First graders performed significantly better in the harmonious condition than in either of the other two conditions. Their performance did not differ in the neutral and contrary conditions.

Kindergarteners' performance did not differ in the harmonious and neutral conditions, but their performance in both was significantly higher than in the contrary condition.

Discussion

Children's expectations facilitate or hinder comprehension of the passive transformation depending on whether the information in a passive sentence is harmonious or contrary to what the child anticipates. More recent work by Gowie (1973) indicates that expectation also affects comprehension of the Minimum Distance Principle. One could reasonably predict that expectation would similarly influence performance with many other syntactic structures.

Within the grade by expectation interaction, the absence of a significant difference between Kindergarten and grade

one in either the harmonious or contrary condition is also consistent with previous research. Gowie and Powers (1972) reported similar results in the harmonious condition. Apparently sentences consistent with expectation are facilitative to about the same degree in both groups. The absence of a difference between grades in the contrary condition, however, may be somewhat surprising. On the one hand, passive sentences contrary to expectation may very well be an equal hinderance to both groups. Conversely, one would have predicted (based on the results reported by Gowie and Powers, 1972), that Kindergarteners would be more adversely affected by the contrary condition than first graders since the latter group should have better command of the transformation. The study by Hutson and Powers (1973) using probable and improbable passive sentences found Kindergarteners significantly below first graders in the improbable condition as well.

There is an important difference between these two studies and the present one. In the Gowie and Powers experiment, the children were presented with pairs of pictures and, upon hearing each sentence and related question, responded by marking the picture of the actor which correctly answered the question. In the Hutson and Powers study, the children demonstrated each sentence using toys. The present data were obtained entirely verbally. Each sentence was read to the children who responded verbally to a related question.

Apparently first graders have not mastered the structure much better than Kindergarteners at the more abstract verbal level. This is further substantiated by the lack of any significant difference in the main effect of grades. Possibly first graders are ahead of Kindergarteners in mastering the passive structure to the extent that, given pictures and objects, they can capitalize on non-linguistic cues, whereas Kindergarteners cannot.

The result that Kindergarteners surpassed first graders in the neutral condition within this same interaction was somewhat unexpected. Gowie and Powers (1972) found in this same interaction that first graders performed better than Kindergarteners in the neutral condition. In the present study, with an exclusively verbal mode of presentation and response, the difference between these two means is barely significant at the .05 level. (The difference between the means is .92 and the critical value is .87.) Perhaps with replication the difference would not recur.

A more troublesome result is afforded by the blocking variable of word association scores. Those children furnishing more paradigmatic responses performed poorer on the passive sentences than those giving more syntagmatic responses. It is strongly suspected that this reversal is due to difficulties encountered in the collection of the word association data and in their scoring. Soon after the data collection began, it became obvious that it was not feasible to establish a

criterion for high and low paradigmatic response. To obtain a sufficient number of responses that could be classified as distinctly high or low across grades, a prohibitively large number of children would have been required for the sample. Therefore, each child was tested and classified as high or low by a median split within each grade and sex. This nesting of the word association variable eliminated the need for extensive sampling, but caused another difficulty. The medians used for the splits were somewhat similar (Kindergarten males,11, Kindergarten females,15; first grade males, 17, first grade females,18). As a result, many children classified as low paradigmatic responders actually had rather high scores on the 21 item test. In addition, the high and low groups were not greatly different, due to the similarity of these medians. (There were, however, some children who were still primarily syntagmatic responders.)

Additional complications were encountered with the scoring of responses. Some responses were ambiguous. For example, the stimulus "river" often elicited the response "fish" which would be scored differently depending on whether the child meant one could "fish in a river" or that one "caught fish in a river." Unfortunately the ambiguity was not always discerned at the time of the data collection. For the purpose of scoring, the strategy adopted was that an ambiguous response was classified as syntagmatic or paradigmatic according to the preponderance of that child's responses.

Still another problem was that some children, when unable to produce an immediate response, would attempt to create their own antonyms. For example, the stimulus word "sky" might elicit the response "not sky." These responses were scored as paradigmatic on the supposition that the child was attempting to produce a word of the same part of speech. If, in fact, this type of response should be regarded as syntagmatic, it is possible that a child producing several of them would be misclassified. If enough children were thus misclassified, the high "paradigmatic" groups could be more "syntagmatic" than the low "paradigmatic" groups.

These difficulties were perceived after the fact, that is, after the unexpected direction of the significant F test was observed. The data are presently being rescored and re-analyzed in an attempt to determine whether or not they are aberrations.

Summary and Conclusions

Passive-voice sentences were constructed to be harmonious, neutral, or contrary to the expectations of males and females in Kindergarten and first grade. The effects of these expectations and the predominate type of word association given by each child (syntagmatic or paradigmatic) were investigated using sentences in the passive voice as experimental materials.

The study generally attempted to investigate passive sentences in a fashion as similar as possible to the way children must deal with them in everyday life. For this reason, all of the sentences used were logically reversible. However, those in the harmonious and contrary conditions were effectively non-reversible to the children. A sentence such as "The girl was called by the mother" appears on the surface to be reversible, but 18 out of 20 first graders expected the mother, rather than the girl, to call. Thus, the sentence was non-reversible to most first graders in the sample. It seems likely that a child will encounter sentences such as "The mother was called by the girl" (contrary), more often than "The dog was eaten by the bone" (nonreversible). Also, to approach reality, the entire study was conducted verbally. Children do not, in everyday life, respond to passive sentences by arranging dolls or marking pictures --- they must learn to hear and respond to them verbally.

The results of the study indicated that first graders cannot deal with passive sentences any more efficiently than Kindergarteners at the verbal level, even though their performance had been found to be superior when they are given nonverbal cues. In addition, the ability of children in both grades to respond correctly to passive sentences is greatly influenced by their expectations.

Lastly, with respect to word associations, it would seem unwise to attempt to measure this phenomenon using a completely free association test, at least with young children. A

better procedure is probably to employ a forced choice method such as that used by Ervin (1961). The importance of care in data collection and scoring when dealing with this variable cannot be overemphasized. An experimenter must be sure when recording a response that he knows exactly what the child means. It might be wise to have the child attempt to use every one of his responses in a sentence. Many words can function as more than one part of speech and an experimenter might not recognize all of them without a clue.

Finally: children's performance on passive-voice sentences was influenced by expectation: and the experimenter was dismayed by word associations.

Table 1

Reversible Items Used in the Final Kindergarten Instrument and Numbers of Children Selecting Each Alternative [1]

A. Items showing expectation	Number of Children	
1. a horse would kick a cow	15	H[2]
a cow would kick a horse	5	
2. a mother would call a girl	15	C
a girl would call a mother	5	
3. a child would help a policeman	0	H
a policeman would help a child	20	
4. a horse would chase a donkey	15	H
a donkey would chase a horse	5	
5. a cat would tease a dog	5	C
a dog would tease a cat	15	
6. a bicycle would bump a wagon	14	C
a wagon would bump a bicycle	6	
7. a cat would smell a rat	16	C
a rat would smell a cat	4	
8. a seal would watch a kangaroo	4	H
a kangaroo would watch a seal	16	
9. an elephant would push a giraffe	17	H
a giraffe would push an elephant	3	
10. a hunter would see a deer	13	C
a deer would see a hunter	7	
11. a kitten would lick a puppy	7	C
a puppy would lick a kitten	13	
12. a boy would tease a girl	16	C
a girl would tease a boy	4	
13. a canary would peck a parakeet	4	H
a parakeet would peck a canary	16	
14. a raccoon would catch a fox	5	C
a fox would catch a raccoon	15	

15.	a car would bump a truck	5	H
	a truck would bump a car	15	
16.	a boy would call a girl	15	H
	a girl would call a boy	5	

B. Neutral items

17.	a sheep would watch a pig	10
	a pig would watch a sheep	10
18.	a car would follow a truck	10
	a truck would follow a car	10
19.	a bus would pass a truck	10
	a truck would pass a bus	10
20.	a robin would bump a sparrow	10
	a sparrow would bump a robin	10
21.	a Indian would find a cowboy	10
	a cowboy would find an Indian	10
22.	a frog would kick a turtle	11
	a turtle would kick a frog	9
23.	a rooster would see a duck	10
	a duck would see a rooster	10
24.	a doctor would call a nurse	11
	a nurse would call a doctor	9

1 Each of the situations was presented to the child in the form "Do you think that... or that... ?"

2 The letters H or C next to the frequencies in part A of the table indicate whether the situation was used to construct a sentence harmonious or contrary to expectation. All of the situations in part B were used to construct neutral sentences.

Table 2

Reversible Items Used in the Final First Grade Instrument and Numbers of Children Selecting Each Alternative[1]

A. Items showing expectation	Number of Children	
1. a bird would watch a cat	3	H[2]
a cat would watch a bird	17	
2. a policeman would warn a man	19	H
a man would warn a policeman	1	
3. a rabbit would push a squirrel	15	H
a squirrel would push a rabbit	5	
4. a child would answer a teacher	17	C
a teacher would answer a child	3	
5. a mother would call a girl	18	C
a girl would call a mother	2	
6. a chair would touch a table	19	C
a table would touch a chair	1	
7. a child would help a policeman	0	H
a policeman would help a child	20	
8. a horse would chase a donkey	18	C
a donkey would chase a horse	2	
9. a rabbit would chase a fox	4	C
a fox would chase a rabbit	16	
10. a rat would smell a cat	1	C
a cat would smell a rat	19	
11. a giraffe would push an elephant	2	H
an elephant would push a giraffe	18	
12, a rabbit would trip a cow	3	H
a cow would trip a rabbit	17	
13. a lion would find a monkey	6	C
a monkey would find a lion	14	
14. a deer would see a hunter	4	H
a hunter would see a deer	16	
15. a girl would tease a boy	1	H
a boy would tease a girl	19	

16.	a fox would catch a raccoon	18	C
	a raccoon would catch a fox	2	

B. Neutral items

17.	a pig would watch a sheep	10
	a sheep would watch a pig	10
18.	a dog would frighten an owl	10
	an owl would frighten a dog	10
19.	a bear would bite a fox	10
	a fox would bite a bear	10
20.	a frog would kick a turtle	11
	a turtle would kick a frog	9
21.	a rooster would see a duck	11
	a duck would see a rooster	9
22.	a lion would smell a tiger	9
	a tiger would smell a lion	11
23.	a cow would lick a horse	9
	a horse would lick a cow	11
24.	a doctor would call a nurse	11
	a nurse would call a doctor	9

[1] Each of the situations was presented to the child in the form "Do you think that ... or that ... ?"

[2] The letters H or C next to the frequencies in part A of the table indicate whether the situation was used to construct a sentence harmonious or contrary to expectation. All of the situations in part B were used to construct neutral sentences.

Table 3

Analysis of Variance
Grade X Sex X Word Association X Expectation

Source	df	MS	F
Between Subjects	71		
Grades (G)	1	.17	< 1
Sex (S)	1	.67	< 1
Word Association (W) within G and S	4	34.92	5.07**
G X S	1	.29	<1
Error 1	64	6.89	
Within Subjects	144		
Expectation (E)	2	38.34	19.36**
G X E	2	11.35	5.73*
S X E	2	.79	< 1
W X E within G and S	8	1.38	<1
G X S X E	2	.06	<1
Error 2	128	1.98	
Total	215		

* $p < .005$
** $p < .001$

Table 4

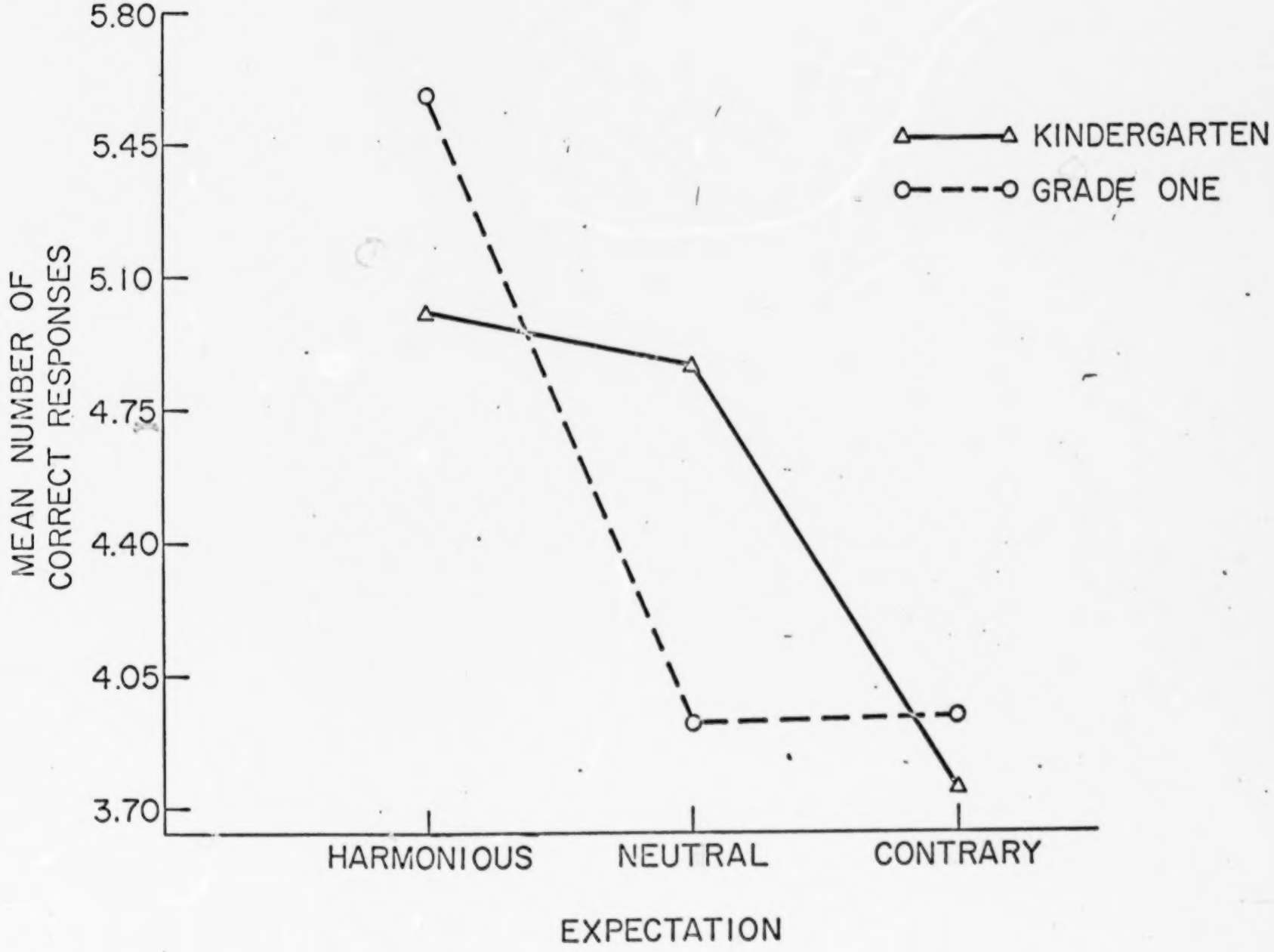
Means for the Grade by Expectation Interaction[1]

		Condition		
		Harmonious	Neutral	Contrary
Grade	Kindergarten	5.00	4.86	3.75
	First	5.58	3.92	3.94

[1]If two means are on opposite sides of the diagonal, they are significantly different ($p < .05$).

FIGURE ONE.

GRADE BY EXPECTATION INTERACTION



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